

IN THE CLAIMS:

Please cancel claims 1-44 without prejudice or disclaimer.

Please add new claims 45-85 as follows:

45. (New) An impact driver for driving an elongate object into a body, said impact driver comprising

- a) a chassis
- b) a ram supported by said chassis in a manner allowing rectilinear movement of said ram relative to said chassis,
- c) a linear induction motor including
 - (i) a stator mounted to said chassis, and
 - (ii) a linear induction motor reaction member mounted to said ram,
 - (iii) the stator being positioned to operatively interact with the linear induction motor reaction member to accelerate the reaction member substantially along a length of movement of the reaction member to move the reaction member
 - from a retracted position to an impact position, and
 - from the impact position to the retracted position,
- d) whereby, when the reaction member is accelerated to move from said retracted condition to said impact position, the ram is accelerated substantially throughout its movement by the reaction member to increase its kinetic energy for causing an impact force to be imparted on said elongate object in the elongate direction thereof.

46. (New) The impact driver as claimed in claim 45, wherein said ram includes an impact head for receiving an impact force from the ram and transmitting it to an elongate member.

47. (New) The impact driver as claimed in claim 46, wherein said ram includes an elongate ram support structure, said ram support structure having a first and second ends, and wherein said impact head is provided at a first end of said ram support structure.

48. (New) The impact driver as claimed in claim 47, wherein said reaction member is of an elongate configuration, and is secured to the ram support structure to extend in the elongate direction of said ram support structure between said first and second ends thereof.

49. (New) The impact driver as claimed in claim 45, wherein said impact head is of a robust and substantially solid material suitable for the transferral of an impact from the ram to the elongate member.

50. (New) The impact driver as claimed in claim 45, wherein said reaction member comprises at least one plate of a conductive metal material.

51. (New) The impact driver as claimed in claim 45, wherein said ram bears with said chassis in a manner to allow rectilinear movement of said ram relative to said chassis.

52. (New) The impact driver as claimed in claim 45, wherein said chassis provides bearings which locate and support said ram for linear movement within said chassis.

53. (New) The impact driver as claimed in claim 52, wherein said bearings are located within a casing of said chassis, said ram also at least in part provided and retained by said bearings within said casing of said chassis.

54. (New) The impact driver as claimed in claim 52, wherein said stator of said linear induction motor is positioned within the casing of said chassis.

55. (New) The impact driver as claimed in claim 45, wherein said chassis includes a casing defining an elongate chamber within which at least part of said ram is able to move in the elongate direction.

56. (New) The impact driver as claimed in claim 45, wherein the relative position of said ram at least when in one position with respect to said chassis is able to be sensed by an electronic sensor.

57. (New) The impact driver as claimed in claim 56, wherein a said electronic sensor is a limit sensor detecting the reaching of the ram to or proximate to its retracted position.

58. (New) The impact driver as claimed in claim 56, wherein a said electronic sensor is in communication with a controller for controlling of the linear induction

motor, in order for the electronic sensor to actuate the controller to accelerate the hammer from the retracted position to the impact position.

59. (New) The impact driver as claimed in claim 45, wherein said stator is controlled to accelerate the ram from the retracted position to the impact position at a rate greater than from the impact position to the retracted position.

60. (New) The impact driver as claimed in claim 45, wherein a anvil assembly is positioned relative to said chassis to hold an anvil in alignment to the rectilinear direction of movement of said ram to be interposed between the head of said elongate object and said impact head for the purpose of providing a cushioning to the impact force of said ram applied to said elongate object.

61. (New) The impact driver as claimed in claim 60, wherein said anvil assembly is in a translatable engagement with said chassis.

62. (New) The impact driver as claimed in claim 60, wherein said anvil assembly presents said anvil at a location remote from said chassis.

63. (New) The impact driver as claimed in claim 45, wherein said chassis is mounted to a support structure.

64. (New) The impact driver as claimed in claim 60, wherein said chassis is mounted to a support structure and said anvil assembly is in a translatable engagement with said support structure to permit its movement relative thereto

and parallel to the rectilinear direction of movement.

65. (New) The impact driver as claimed in claim 45, wherein said chassis is mounted to a support structure.

66. (New) The impact driver as claimed in claim 65, wherein said support structure includes a mounting arrangement for mounting the chassis to a vehicle.

67. (New) The impact driver as claimed in claim 66, wherein said mounting arrangement allows said support structure to rotate relative to said vehicle.

68. (New) The impact driver as claimed in claim 66, wherein said mounting arrangement allows said support structure to translate relative to said vehicle.

69. (New) The impact driver as claimed in claim 45, wherein said chassis is mounted to a support device selected from one of a vehicle, a vessel and a derrick.

70. (New) The impact driver as claimed in claim 69, wherein said chassis is connected to the support device by an articulated mounting arrangement configured for mounting the chassis to the support device in an articulated manner.

71. (New) The impact driver as claimed in claim 45, wherein the impact driver is a pile driver.

72. (New) The impact driver as claimed in claim 45, wherein the overall

operational height of the impact driver remains less than 3m.

73. (New) The impact driver as claimed in claim 45, wherein the overall operational height of the impact driver remains less than 2.5m.

74. (New) The impact driver as claimed in claim 45, wherein the overall operational height of the impact driver remains less than 2.0m.

75. (New) The impact driver as claimed in claim 45, wherein the overall operational height of the impact driver remains less than 1.5m.

76. (New) A double acting driver for driving elongate objects into a body, said driver comprising

a ram relying on force from a linear induction motor stator and gravity to accelerate the ram substantially throughout its compression stroke, thereby increasing the kinetic energy of the ram for impacting the elongate object.

77. (New) A driver for driving elongate objects into a body, said driver comprising

a ram relying on power from a linear induction motor stator to accelerate the ram substantially throughout its compression stroke thereby increasing the kinetic energy of the ram for impacting the elongate object.

78. (New) A method of driving elongate objects into a body utilizing the impact driver as claimed in claim 45.

79. (New) A method of pile driving utilizing the impact driver as claimed in claim 45.

80. (New) A method of driving elongate objects into a body, said method comprising
utilizing gravity, and a linear induction motor stator interacting with a reactor plate of said ram, to enhance acceleration of the ram beyond 9.81 m/s^2 during its compression stroke, to accelerate an impact ram to impact the head of an elongate.

81. (New) A driver for driving elongate objects into a body, said driver comprising
a ram which is accelerated by assistance of gravity and by a linear induction motor stator interacting with a reactor plate of said ram to enhance acceleration of the ram beyond 9.81 m/s^2 during its compression stroke, thereby substantially increasing the kinetic energy of the ram.

82. (New) An elongate object extraction device for extracting elongate objects that are embedded in a body, from the body, said device comprising
a) a ram driven by a linear induction motor to accelerate the ram in a direction away from the elongate object substantially throughout

the length of an extraction stroke to, thereby to increase the kinetic energy of the ram for transfer of said kinetic energy to the elongate body for extracting the elongate object;

b) said ram including an engaging arrangement for engaging with said elongate object to transmit forces from the linear induction motor to the elongate object, thereby to extract the elongate object; and

c) the movement of the ram being controllable through the linear induction motor to reduce the ram's impact on the elongate object to a lesser extent when the ram returns to a more proximate position to the elongate object between extraction strokes.

83. (New) An elongate object extraction device for extracting elongate objects from a body, said device comprising

a) a chassis

b) a ram supported by said chassis in a manner allowing rectilinear movement of said ram relative to said chassis,

c) a linear induction motor including

(i) a stator mounted to said chassis, and

(ii) a linear induction motor reaction member composed of a conductive material,

(iii) the stator being positioned to operatively interact with the linear induction motor reaction member, and said reaction member being carried by said ram in a manner to allow the ram to be accelerated by the stator of said linear induction motor between

- a first position more proximate to said elongate object and
- an extraction position which is less proximate the elongate member than the first position,
- (iv) the ram being accelerated from said first position to said extraction position by said stator to increase the kinetic energy of the ram for extracting said elongate object.

84. (New) An impact driver for driving elongate objects into a body, said impact driver comprising

- a) a chassis,
- b) a ram supported by said chassis in a manner allowing a rectilinear range of movement of said ram relative to said chassis between two limits,
- c) a ram driver assembly for driving the ram to cause an impact on an elongate object, said ram driver assembly including
 - a linear induction motor having
 - a stator mounted to said chassis, and
 - a linear induction motor reaction member mounted to the ram,
 - the stator being positioned to operatively interact with the reaction member to drive it in a linear manner, and
- d) said reaction member being mounted to said ram in a manner to allow the ram to be reciprocally driven throughout a substantial part of the ram's range of movement by operation of the linear induction

motor between

- (i) a retracted position, and
- (ii) an impact position,
- (iii) wherein driving of the ram by the linear induction motor increases the kinetic energy of the ram for transfer of said kinetic energy to said elongate object via an impact force.

85. (New) An impact driver suitable for driving elongate objects into a body or extracting elongate objects from a body, said impact driver comprising

- a) a chassis,
- b) a ram supported by said chassis in a manner allowing a rectilinear range of movement of said ram relative to said chassis in two opposed directions,
- c) a ram driver assembly capable of moving the ram along a substantial part of its range of movement in both of said two directions, said ram driver assembly including
 - (i) a linear induction motor having
 - (ii) a stator mounted to said chassis, and
 - (iii) a reaction member coupled to the ram,
 - (iv) the stator being positioned to operatively interact with the reaction member to effect a controlled electromagnetic force on the reaction member, thereby to increase the kinetic energy of the ram for transfer of said kinetic energy to said elongate object via an impact force.